

# **Building a Climate-Resilient Montgomery County**

## **Recommendations of the Montgomery County Technical Workgroup on Climate Change Adaptation**

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## BUILDING A CLIMATE RESILIENT MONTGOMERY COUNTY

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## THE MONTGOMERY COUNTY ADAPTATION FRAMEWORK

Montgomery County is already experiencing the effects of climate change. Precipitation and wind intensity have increased, as have temperature extremes, both heat and cold. While the County's major goal is to dramatically reduce GHG emissions, the County also must address climate change impacts already being felt today and take action to adapt and promote resilience for the future. Not all impacts are solely caused by the changing climate, however. Changes in land use and land cover and the design of our infrastructure based on historical weather patterns combined with larger rainstorms exacerbate vulnerability to flooding not previously anticipated in county codes.

To promote resilience comprehensively, Montgomery County must put a "climate change lens" over its hazard mitigation, natural resource management, human health plans and other responsibilities. The adaptation recommendations presented follow a dual path of acting today based on the best information available, while developing better assessments and plans for future impacts, with a particular focus on the most vulnerable people and communities in the County. These recommendations are intended to build on existing hazard mitigation and other planning and operations already underway in Montgomery County and provide co-benefits in addressing multiple climate change impacts and goals. Some County plans and operations will require modifications and, in some cases, extensions to respond to more significant and variable climate-driven hazards and to integrate climate adaptation deeper into County activities, including engagement with residents and the private sector.

Most of the recommendations presented here have many co-benefits and should be considered as part of a whole-of-government approach to climate adaptation. For example, restoration of forest and riparian habitat will promote carbon sequestration, improve the resilience of natural resources, and reduce flooding and erosion associated with intense rain events. Promoting regenerative agriculture in the Ag Reserve, carbon will be sequestered, crops will be more resilient to drought and flooding, and the nutrients in the food produced will be increased, all while providing a local food source and reducing farm-to-table miles. Finally, planting trees in urban and suburban parts of the county will sequester carbon, reduce heat islands in urban areas that help protect the most vulnerable populations who spend time outdoors, and shade buildings thereby reducing the energy costs of cooling.

The recommended adaptation strategies and actions address several major climate change impacts affecting Montgomery County, including: 1) more intense storms resulting in increased flooding and wind damage; 2) higher summer temperatures and winter polar vortex events resulting in risks to human and animal health, natural resources and ecosystems, agriculture, and infrastructure; 3) drought affecting agriculture, natural resources, urban landscapes and water supply; and 4) seasonal shifts and warmer temperatures affecting species diversity, pests, and plant and animal diseases. As described below, these changes are happening now and will intensify in the future.

## **PRECIPITATION, FLOODING, AND WIND**

Heavy precipitation events have increased by 55 percent in Maryland between 1958 and 2016 and could increase by another 40 percent by the end of the century if greenhouse gas emissions are not reduced. This trend is in line with a 2013 study conducted for FEMA that found on average, nation-wide, floodplain Special Flood Hazard Areas is expected to increase in area 40 – 45 percent due to increased precipitation and runoff effects, and estimates for the mid-Atlantic and Northeastern U.S. were estimated to be even greater. In fact, the National Weather Service Local Storm Reports (LSR) of urban flooding in Montgomery County show an upward trend from between 2 to 4 occurrences per year before 2010 to 11 to 39 occurrences per year since 2010. Local Storm Reports also show an increase in the number of significant wind reports in the County. Prior to 2010, the County averaged 25 wind incidents per year; however, since 2010, they have climbed to 44 reports per year as of August 2019.

## **EXTREME HEAT AND COLD**

For the fifth year in a row, the Northeast’s annual average temperature was warmer than normal. 2019 ranked as the region’s 20th warmest year on record and it was the fourth warmest in Maryland. The average annual temperature in Maryland has risen more than 1.5 degrees F since the beginning of the 20th Century, but Montgomery County’s average annual temperature has risen 2.6 degrees F during that same period. Nationwide, this trend is accelerating. The region experienced unusually frigid temperatures in 2014, 2015, and 2019 caused when a polar vortex, a whirlpool of dense, frigid air over the Arctic, either moves south or splits when the stratosphere over Siberia suddenly warms.

## **DROUGHT**

The U.S. Drought Monitor released on September 26, 2019 showed 7 percent of the region was in a moderate drought and 43 percent was abnormally dry. During the first half of October, a majority of the Northeast conditions deteriorated, with the introduction of severe drought in parts of Maryland. In this vein, the Fourth National Climate Assessment suggests that such increases in occurrence and intensity of drought will continue, affecting agriculture nationwide.

## **SEASONAL SHIFTS AND CHANGES**

Scientists at the University of Maryland Center for Environmental Science examined 114 years of data and found that climate changes are clearly evident in Maryland and species and habitats are responding to those changes. There are 30 more warm summer nights per year now than 100 years ago (the number of days in a year where the minimum temperature does not go below 68°F). The length of the growing season has increased by more than 30 days over the last century. The number of frost days per year has dropped by more than 30 days. Shorter and warmer winters increase the likelihood that animal and plant pests and pathogens will survive. Shifts in the timing of spring and fall could impact wildlife that rely on environmental cues to know when to migrate.

## **ORGANIZATION OF RECOMMENDATIONS**

Recommendations are organized under nine major Goals, each of which includes several general Strategies with specific Actions that the County can take to build its resilience to climate change. A companion spreadsheet with the same content is also provided for ease in sorting and filtering.

Note that the workgroup was not afforded sufficient time to prioritize recommendations. Furthermore, there are many actions that can be taken under current County capabilities. The Adaptation Workgroup is prepared to make such recommendations at a future date.

### **The major Goals include:**

- Goal 1: Prioritize people and communities that are the most vulnerable and the most sensitive to the impacts of climate change.
- Goal 2: Reduce the risks and impacts of higher summer temperatures.
- Goal 3: Reduce risks and impacts of more intense storms.
- Goal 4: Protect public health from climate-driven impacts.
- Goal 5: Ensure the availability and sustainability of quality drinking water supplies to support a growing and thriving Montgomery County.
- Goal 6: Conserve and restore habitat to support healthy populations and ecosystems, reduce non-climate stressors on natural resources, and promote climate-resilient agriculture.
- Goal 7: Support economic opportunities and address economic challenges for climate adaptation.
- Goal 8: Conduct a vigorous outreach and engagement campaign to accelerate adaptation and resilience.
- Goal 9: Reevaluate and update county operations, strategies, and codes to account for the risks of climate change impacts as well as to reduce greenhouse gases.

**GOAL 1: PRIORITIZE PEOPLE AND COMMUNITIES THAT ARE THE MOST VULNERABLE AND THE MOST SENSITIVE TO THE IMPACTS OF CLIMATE CHANGE.**

**Rationale:** Those most at risk from the impacts of climate change are people who are economically disadvantaged, elderly, children, and people with underlying medical conditions. The economically disadvantaged do not have the resources to mitigate their risk, move to safe areas, or cope with disasters when they occur. Others at high risk are the elderly who may be isolated or lacking resources; and children and people with underlying medical conditions who are more susceptible to mold, heat and other climate impacts. However, strategies to build climate resilience have the potential to create or exacerbate existing inequities, for example, by raising property values and pushing lower income people out. Therefore, resilience strategies must be accompanied by policies to create more social and racial equity, not less. The national movement for a Just and Equitable Climate Future identifies four main themes: 1) A healthy climate and air quality for all; 2) Access to reliable, affordable, and sustainable electricity, water, and transportation for every community; 3) An inclusive, just, and pollution-free energy economy with high- quality jobs; and 4) Safe, healthy communities and infrastructure. These principles reflect recommendations made throughout this document.



2018: Human Health. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II

**Strategies:**

- 1-1. Adopt strategies and actions that focus on building resilience for vulnerable and marginalized communities.**
- 1-2. Prioritize reducing health risks of the most vulnerable populations.**

**Actions:**

**1-1. ADOPT STRATEGIES AND ACTIONS THAT FOCUS ON BUILDING RESILIENCE FOR VULNERABLE AND MARGINALIZED COMMUNITIES.**

- a) Engage vulnerable communities to increase awareness and to co-develop preparedness solutions.
- b) County policies to improve the resilience of communities and neighborhoods must ensure that resilience strategies do not cause or exacerbate inequities and displacement.
- c) Integrate projections of climate change impacts, improve GIS data layers on demographics and vulnerable populations, and conduct vulnerability assessments to aid in targeting resources and addressing impacts on vulnerable populations and communities.
- d) Update the County Hazard Mitigation Plan and emergency response operations to prioritize vulnerable areas where retrofit plans are least effective and include post-disaster policies for building back to be more resilient.
- e) Review all county operations to prioritize actions for the most vulnerable communities in the most essential sectors of our society, particularly hazard mitigation, emergency response, health department services, transportation, residential services, parks and landscaping, building-related codes and standards, etc.
- f) Expand the number of emergency shelters and cooling stations based on need and ensure they are readily accessible and themselves retrofitted to the highest standards, including to avoid flooding, withstand strong wind, extreme temperatures, power outages, and depleted water supplies.
- g) Ensure that climate change policies, planning and response plans include highly vulnerable populations, such as children, the elderly, those with underlying health conditions, and economically disadvantaged populations. Collaborate across sectors, and among nongovernmental and governmental entities, to develop comprehensive mitigation and adaptation plans that protect the most vulnerable.
- h) Adopt standards and practices for outdoor workers and farm workers to protect their health and safety during extreme events.
- i) Ensure adequate facilities and protections for homeless population during extreme cold, extreme heat, or severe storm events.
- j) Provide incentives and subsidies to landlords and low-income homeowners to install adaptive technologies and retrofit buildings, and where necessary, adopt county codes and standards requiring climate-adapted housing and development in targeted areas.

**1-2. PRIORITIZE REDUCING HEALTH RISKS OF THE MOST VULNERABLE POPULATIONS.**

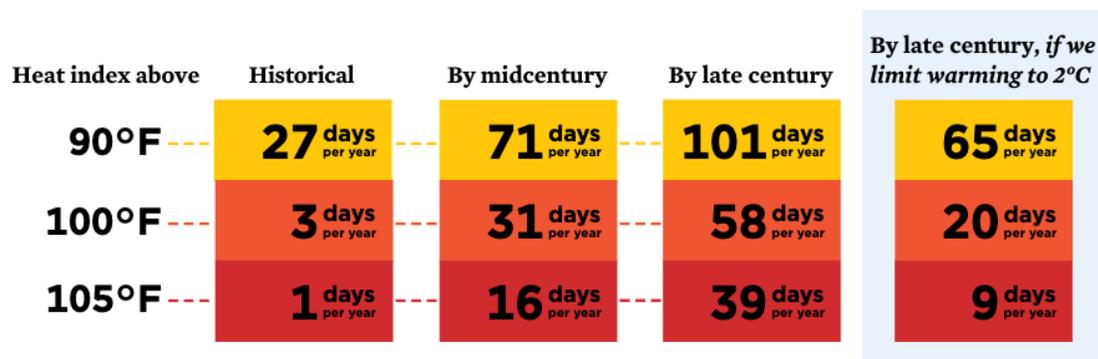
- a) Expand urban tree canopy and green infrastructure in low-income neighborhoods, especially targeting areas with high pedestrian traffic to mitigate urban heat island effects and to provide cool corridors for walking.
- b) Promote and subsidize installation of energy efficient air conditioning in low income housing and rental properties, especially during the summer which is getting longer and hotter.
- c) Provide local cooling and cell phone recharging centers, including use of parks, libraries, recreation centers, schools, and other public facilities.
- d) Adopt requirements and/or incentives for landlords to install protections against basement flooding and to mitigate mold.
- e) Review the ability of Lake Needwood Dam and all other County high-and significant-hazard dams to withstand stronger tropical and inland storm and revisit potential buyouts of high-risk homes downstream.
- f) Conduct a vigorous public education campaign to alert residents to risks of flooding and how to protect themselves, including risks of asthma due to mold, wet basements, etc.
- g) Amend county building codes requiring developers in areas undergoing significant land cover change to address stormwater runoff impacts of increased impervious cover on existing homes.
- h) Direct the County Department of Health and Human Services to monitor and address a broad range of climate-related health impacts, including vector-borne diseases (mosquitos, ticks), mold and asthma, water-related illnesses, food safety, temperature stress, and mental health, with a particular emphasis on the most vulnerable populations.

## GOAL 2: REDUCE THE RISKS AND IMPACTS OF HIGHER SUMMER TEMPERATURES.

**Rationale:** The most certain impact of climate change at local scales is a steady overall rise in average temperatures; and exposure to high temperatures is the major cause of death due to climate change. The average annual temperature in Maryland has risen more than 1.5°F since the beginning of the 20th Century, but Montgomery County’s average annual temperature has risen 2.6°F during that same period. Furthermore, climate modeling suggests dramatic increases in the number of high heat days in Montgomery and surrounding counties- source, Union of Concerned Scientists, “Killer Heat - Extreme Heat in Maryland’s 8th District. *\*editor’s note: the new consensus is that humanity must limit future average global warming to 1.5°C to avert critical impacts.*

Extreme heat is a serious public health threat and is one of the deadliest effects of climate change, causing hyperthermia, cardiovascular incidents, worsening air quality, propagation of vector borne diseases, and when combined with nutrient pollution, can cause toxic harmful algal blooms in drinking water sources. It is essential to adopt cooling strategies early, especially since some take years to realize benefits, such as planting shade trees and other green infrastructure.

Annual Days of Extreme Heat Per Year in Maryland's 8th District



*With no action to reduce global heat-trapping emissions, the average frequency of extreme heat in this district would rise as shown here. Taking rapid action to reduce emissions and cap future global warming at 2°C (3.6°F) would limit the increase in extreme heat days. For more information and detailed data, visit [www.ucsusa.org/killer-heat](http://www.ucsusa.org/killer-heat).*

#### Strategies:

- 2-1. Establish county-wide temperature reduction goals.
- 2-2. Promote cool and energy efficient building standards for both the public and private sectors.
- 2-3. Expand the county's urban canopy and greening programs.
- 2-4. Promote landscaping in the private sector to expand shade and reduce urban heat islands.

#### Actions:

##### 2-1. ESTABLISH COUNTY-WIDE TEMPERATURE REDUCTION GOALS.

- a) Deploy a uniformly distributed network of small temperature and humidity sensors... (HOBOS) to monitor heat and reduce heat-related mortality and/or morbidity
- b) Conduct regional climate modeling to assess neighborhood-scale climate and health benefits of a tree planting campaign or a cool roofing ordinance
- c) Develop an urban heat vulnerability index and mitigation plan to prepare for higher temperatures and more frequent extreme heat. Use this data to inform decisions made related to building codes, emergency management plans, and other climate change related sectors.
- d) Track the impact of extreme heat mitigation and adaptation strategies and share lessons learned.

**2-2. PROMOTE COOL AND ENERGY EFFICIENT BUILDING STANDARDS FOR BOTH THE PUBLIC AND PRIVATE SECTORS.**

- a) Promote use of cool materials (cool roofs, cool pavements and road surfaces, green walls
- b) Evaluate and adopt model building codes for green roofs/cool roofs, pavements, and green walls. Incorporate performance goals of codes into requirements for approved public building projects and private construction standards for permit approval.
- c) Evaluate and adopt flexible building codes that incentivize or require new and renovated buildings to minimize the energy required to operate the building under extreme weather conditions or power loss, while also protecting community members (residential and occupational) against extreme heat.
- d) Use energy-efficient air conditioning and other building infrastructure that reduce energy use, reduce waste heat, and minimize urban heat gain.
- e) Tactically encourage airflow for optimum ventilation inside and around a building or development.
- f) Consider design strategies, such as operable windows or cooling systems connected to backup power sources, that help maintain safe indoor temperatures during hot-weather power outages.
- g) Assess and monitor long-term risks from extreme heat over the lifetime of a building, development, or city to understand the likely impacts on users and community members.
- h) Work with MCPS to revise their temperature plan to consider the heat island effect of artificial turf.
- i) Conduct review of performance of road, rail, bridge and other transit materials under high heat conditions, and consider transportation design options that minimize urban heat island effect.

**2-3. EXPAND THE COUNTY'S URBAN TREE CANOPY AND GREENING PROGRAMS.**

- a) Analyze tree canopy in Montgomery County and plant trees in communities with limited tree canopy to grow a more equitable tree canopy by 2028.
- b) Adopt and implement an aggressive goal to plant more trees throughout the County.
- c) Develop a strategy focused on protecting the County's existing trees from extreme drought and flash drought, including educating homeowners on how to protect their trees from severe drought.
- d) Educate homeowners and the landscaping sector on protecting their trees from severe drought, eliminating mulch mounds that kill trees, and other tree protection measures.
- e) Work with and require utility providers to protect trees.
- f) Provide an incentive for residential and multi-family property owners by providing a 0.5% annual property tax relief for every tree planted and healthy beyond 20 trees per acre.

- g) Adjust the County Tree Canopy Ordinance that assesses builders a fee for removing trees to require functional mitigation that replaces the lost benefit of trees, e.g., cooling, stormwater abatement, watershed replenishment, etc. Require developers to seek revisions to their permits before removing trees. Use the fee to pay for off-site functional mitigation.
- h) Strategically maximize shade—through built and natural cover—for all buildings and public spaces. Plant more trees and vegetation on public lands to provide cooling, shade, and heat/CO2 absorption
- i) Work with federal and other jurisdictions located in Montgomery County to expand shading and cooling.
- j) Establish green corridors and other alternative, heat-sensitive planning measures.
- k) Improve streetscape standards, such as permeable surfaces, wider bike lanes for mitigation, infiltration, and tree canopy increase.

#### 2-4. PROMOTE LANDSCAPING IN THE PRIVATE SECTOR TO EXPAND SHADE AND REDUCE URBAN HEAT ISLANDS.

- a) Adopt credits for builders for the percentage or coverage of shade trees retained and planted on-site to encourage the use of shade trees to provide additional summer protection for lower floors of building facades and green roofs to reduce heat island effect while providing comfortable exterior environments.
- b) Educate and work with the landscaping community to understand the impacts of climate change and incentivize them to adopt best climate practices, such as reducing use of fossil fuels in equipment, planting native- and climate-resilient species, protecting trees (no more mulch mounds), using water-wise strategies, etc.
- c) Prioritize the preservation of green space on new development and redevelopment parcels; and expand green space on existing development parcels.
- d) Ensure greening selections are appropriate for local climate conditions and water availability.

### GOAL 3: REDUCE RISKS AND IMPACTS OF MORE INTENSE STORMS.

**Rationale:** According to the Maryland Climate Change Commission and the U.S. Global Change Research Program, between 1950 and 1994, annual precipitation in the Northeast was more variable and increased by approximately 0.39 inches per decade; and Maryland’s annual mean precipitation has been above average for the past two decades. In the Northeast the frequency of intense rainfalls has also increased 71 percent from 1958 to 2012. These trends are expected to continue.

When combined with the low permeability of the majority of urban surfaces, large quantities of runoff overwhelm the capacity of stormwater drainage system. Inland bridges are particularly vulnerable to increased riverine storm flow and flooding, and the U.S. Geological Survey hydrologic region which includes most of Maryland is expected to experience some of the greatest impacts, with 76 percent of inland bridges (i.e., more than 20,000) projected to be vulnerable by 2100 if the greenhouse gas emissions continue unabated. However, according to Maryland's latest analysis, successfully reducing GHGs to limit global warming to a 2° Celsius scenario reduces this proportion to 35 percent. (editor's note: current consensus is that humanity must limit global warming to 1.5°C to avert the most critical impacts.) The cost of damages from inland flooding in Maryland under a business-as-usual scenario is projected to be between \$1 and \$2 billion (in 2014 \$) in 2100, significantly different from historic numbers.



#### Strategies:

- 3-1. Improve hydrological and meteorological data collection and analysis of wet weather and storms, considering climate change over the next 30 to 100 years, and incorporating trends in land use/land cover change.**
- 3-2. Adopt aggressive requirements for all new development to transition Montgomery County to realities of climate change.**
- 3-3. Work with homeowners, businesses, and the building and services sectors to retrofit existing homes and buildings to protective standards.**
- 3-4. Initiate a comprehensive review of transportation infrastructure, dams, and other public utilities and undertake efforts to improve preparedness and resilience**

**Actions:**

**3-1. IMPROVE HYDROLOGICAL AND METEOROLOGICAL DATA COLLECTION AND ANALYSIS OF WET WEATHER AND STORMS, CONSIDERING CLIMATE CHANGE OVER THE NEXT 30 TO 100 YEARS, AND INCORPORATING TRENDS IN LAND USE/LAND COVER CHANGE.**

- a) Work with the Montgomery County Delegation to support legislation and appropriations to fund NOAA to update mid-Atlantic precipitation statistics, along with the States of Virginia, North Carolina and others, that are already so engaged. Subsequently, work with FHWA and NOAA to revise Maryland's IDF precipitation statistics and to adopt a methodology for updating future precipitation statistics for use in planning and design.
- b) Update County floodplain maps to the 30-acre watershed, and map small drainage areas that are currently unmapped. Ensure that development permits are not issued without a Natural Resources Inventory that includes the requirement to delineate unmapped floodplains in the vicinity of the proposed development.
- c) Improve impervious surface mapping throughout the county.
- d) Develop a report identifying all aspects of current Montgomery County Code, including requirements of the State of Maryland, that include reference to rainfall and water flow in design standards and other requirements. For each requirement, report on the basis of how and when the numerical quantity requirement was derived, and identify any efforts by federal, state, academic, or private sector efforts to evaluate adequacy of such standards. Examine the Maryland Stormwater Design Manual, NOAA Atlas 14, TR-55, other code or statute, noting the date, source, and method of data development.
- e) Conduct a community survey on home flooding events to identify unreported flooding "hotspots" and understand home flooding trends.
- f) Consult with County flood remediation and cleanup businesses on trends, costs, and hotspots and areas with changing flooding vulnerabilities.
- g) Deploy more rain and stream gauges throughout the county to build a more accurate observational ability to monitor changes over time.

**3-2. ADOPT AGGRESSIVE REQUIREMENTS FOR ALL NEW DEVELOPMENT TO TRANSITION MONTGOMERY COUNTY TO REALITIES OF CLIMATE CHANGE.**

- a) Amend County building codes and enforcement policies post-permitting to ensure all runoff controls, including conservation plantings in place of structural controls, are maintained and effective. Revisit current policies enabling waivers, unenforceability of green infrastructure maintenance, and impacts on neighbors. Ensure that county codes minimize impacts of increased flooding on immediately

adjacent neighbors, taking into account both increased intensity of rainfall and increased impervious ground cover.

- b) Develop climate resilience guidelines for new development projects that take into account reasonably foreseeable future hydrologic conditions in the drainage area.
- c) Before being approved by a Zoning Commission, BZA, or other related reviewal process, new private developments must employ a variety of climate-hazard mitigation techniques, such as cooling, stormwater retention, sequestration tactics, etc.
- d) Evaluate the sequencing of agency approvals for new building development projects to determine the best point at which to incorporate flood review.
- e) Hire a consultant to identify and evaluate a variety of trends within architecture and sustainable design that has proven effective and feasible in implementation and outcome regarding risk mitigation.
- f) Require all planned unit developments and publicly financed projects to complete an adaptation checklist based on climate resilience guidelines.
- g) Require contractors to send notices to all adjacent homeowners of potential impacts, including suggestions for how to protect their own properties from future rainfall events and runoff impacts.
- h) Adopt aggressive county codes to limit impervious concrete surfaces and require the use of pervious pavements, especially in county-funded projects. For example, sidewalks, driveways and parking lots should use pervious pavements to reduce runoff and flooding that overwhelms the storm sewer system.
- i) Aggressively promote and incentivize use of green roofs, native plantings, rain gardens, rain barrels, runoff retention, and other nature-based ways to reduce runoff and to minimize the heat island effect. (new and existing buildings). However, when used for stormwater management, ensure that green remedies are maintained and effective over time, and are combined with appropriate gray infrastructure to manage excess water flow.

### **3-3. WORK WITH HOMEOWNERS, BUSINESSES AND THE BUILDING AND SERVICES SECTORS TO RETROFIT EXISTING HOMES AND BUILDINGS TO PROTECTIVE STANDARDS.**

- a) Evaluate existing stormwater management environmental site design BMPS as well as structural BMPs and work with homeowners and the construction and landscaping sectors to adopt upgraded BMPs.
- b) Put a moratorium on stormwater waivers until updated practices are adopted by the County to reduce flooding.

- c) Conduct a public education campaign on FEMA NFIP insurance; develop an incentive program to encourage residents to obtain flood insurance no matter where they live in the county.
- d) Conduct a vigorous public education campaign to alert homeowners and renters to risks of flooding and how to protect themselves, including risks of asthma due to mold, wet basements, etc.
- e) Educate home and property owners and promote strategies for managing water on their property; e.g., rainscapes and rain barrels to slow roof runoff, retain water for landscape use, reduce impacts of stream “downcutting” and erosion.
- f) Investigate programs to incentivize retrofitting existing homes including rebates, discount programs, working with insurance companies to provide discounts, etc.
- g) County hazard mitigation and emergency response plans should prioritize vulnerable areas where retrofit plans are least effective and should include post-disaster policies for more resilient recovery requirements.

**3-4. INITIATE A COMPREHENSIVE REVIEW OF TRANSPORTATION INFRASTRUCTURE, DAMS, AND OTHER PUBLIC UTILITIES AND UNDERTAKE EFFORTS TO IMPROVE PREPAREDNESS AND RESILIENCE.**

- a) Conduct a comprehensive review of roads, bridges, and culverts throughout Montgomery County; identify those in need of repair and assess adequacy of capacity based on overlay of land use changes, precipitation projections, and other factors affecting flow and discharge. Target priority roads and culverts to repair and mitigate potential damages. Specifically focus on small culverts, storm drains, swales and ditches, curbs and gutters.
- b) Revisit potential voluntary buyouts in areas at highest risk of catastrophic flooding, especially below the Lake Needwood Dam. Retrofit at-risk buildings or remove them from high-risk areas. Address potential unintended consequences of retrofitting.
- c) Evaluate emergency evacuation routes for adequacy under future climate scenarios.
- d) Assess whether the County (and its dam owners) are using best practices for operations, emergency action planning, maintenance, and alert/warning.
- e) Renew efforts to evaluate and address risk of communities located below dams and along major waterways.

**GOAL 4: PROTECT PUBLIC HEALTH FROM CLIMATE-DRIVEN IMPACTS.**

**Rationale:** The 2016 *Maryland Climate and Health Report* found that, between 2000 and 2012, extreme summer heat events increased the risk of hospitalization for heart attack by 11 percent statewide and by

up to 43 percent in some areas; and increased the risk of hospitalization due to asthma by 22 percent. And overall, increased temperatures and nutrient loads from runoff are expected to expand suitable habitats for toxic freshwater and marine algae, and to increase the likelihood of County residents encountering *Vibrio* bacteria, including bacteria that causes cholera, infections of open wounds, etc. In fact, WSSC issued its first toxic harmful algal bloom advisory on the Duckett Reservoir this past summer, a phenomenon that is increasing nationwide.

Extreme precipitation poses a threat to drinking water supplies – heavy rain preceded 68 percent of waterborne disease outbreaks between 1948 and 1994. Climate also influences the habitat, population, and active season of ticks, which spread Lyme disease and mosquitoes that spread West Nile virus and other pathogens. According to one recent review, the Gulf Coast Tick, which had a historic range suitable to its name, has expanded its geographic distribution northwards, including into the piedmont and coastal areas of Maryland.

Food-borne illness is also at increased risk. Both extreme heat and extreme precipitation events increased the risk of Salmonella infection in Maryland. Compared to 2010, increases in the frequency of extreme heat events during summer months in 2040 are projected to result in a higher rate of Salmonella infection in Maryland.

Risk of drowning and automobile accidents are increasing during extreme rain events. The risk of motor vehicle accidents in Maryland rose 23% and was highest during the Fall season and on roads with defects or obstructions. Because motor vehicle accidents are a major regional cause of injury-related emergency room visits and hospitalizations, the health and cost impacts of increasing extreme weather events on motor vehicle accidents may be significant.



**Strategies:**

- 4-1. Integrate climate change risks into Montgomery County health and human services, hazard mitigation, and emergency response operations.**
- 4-2. Minimize food, water and vector borne disease.**
- 4-3. Protect the most vulnerable from asthma, heart attacks, and other respiratory illnesses.**
- 4-4. Guard against increasing risks of motor vehicle accidents and drowning.**
- 4-5. Undertake a vigorous public outreach campaign aimed at empowering the public with the knowledge and support to avoid and minimize health effects of climate change.**

**Actions:**

**4-1. INTEGRATE CLIMATE CHANGE RISKS INTO MONTGOMERY COUNTY HEALTH AND HUMAN SERVICES, HAZARD MITIGATION, AND EMERGENCY RESPONSE OPERATIONS.**

- a) Review information from the State of Maryland, the CDC, and southern states that are analogues to Montgomery County's climatic future, to understand our future health profile.
- b) Engage with the State and the Center for Disease Control and take advantage of available grants, pilot programs, technical assistance, and public outreach events.
- c) The County Department of Health and Human Services should develop a comprehensive, long-range, and proactive Climate Change and Public Health Strategy that addresses the health risks exacerbated particularly by climate change, including anticipating public anxieties over loss of services during major climate events.
- d) Work with the Center for Disease Control and the State of Maryland Health Department to adopt health surveillance and early warning systems to monitor and predict climate change impacts.
- e) *Ensure that climate change policies, planning and response plans include highly vulnerable populations, such as children, the elderly, those with underlying health conditions, and economically disadvantaged populations. Collaborate across sectors, and among nongovernmental and governmental entities, to develop comprehensive mitigation and adaptation plans that protect the most vulnerable populations. (dup)*
- f) Quantify potential health impacts to inform decision making and strategies, with analysis of impacts on vulnerable populations and geographies.

**4-2. MINIMIZE FOOD, WATER, AND VECTOR BORNE DISEASE.**

- a) Hire a County entomologist to specialize in managing vectors of disease that are encroaching and becoming more prevalent in the County, as host ranges expand and over-winter.
- b) Expand the mosquito control program especially for the Asian Tiger (*Aedes aegypti*) mosquito.

- c) Install stormwater infrastructure abatement to reduce ponding.
- d) Manage deer population that carries disease from ticks.
- e) Work with WSSC to put in place a more robust Harmful Algal Bloom monitoring programs, including establishing baseline data to track incidents.
- f) Coordinate with the Potomac River Basin Commission and upstream communities to monitor HABs and reduce stressors that result in HABs.

#### **4-3. PROTECT THE MOST VULNERABLE FROM ASTHMA, HEART ATTACKS, AND OTHER RESPIRATORY ILLNESSES.**

- a) Implement heat abatement programs (see section under extreme temperature)
- b) Adopt programs to prevent home flooding and to avoid residential mold (see section addressing storms and floods)
- c) Develop and expand mental health programs aimed at managing climate change-induced stress

#### **4-4. GUARD AGAINST INCREASING RISKS OF MOTOR VEHICLE ACCIDENTS AND DROWNING.**

- a) Assess first-response resources available in the county against increased frequency of significant flooding/flash-flooding events and other emergencies. This should include swift-water rescue and consideration of vehicles that can navigate high water situations.
- b) Invest in automated roadway sensors in roadways prone or at risk of flooding to reduce incidents of drowning.

#### **4-5. UNDERTAKE A VIGOROUS PUBLIC OUTREACH CAMPAIGN AIMED AT EMPOWERING THE PUBLIC WITH THE KNOWLEDGE AND SUPPORT AVOID AND MINIMIZE HEALTH EFFECTS OF CLIMATE CHANGE.**

- a) Train health professionals to understand the health effects of climate change on families, children, the elderly, those with underlying health conditions, and economically disadvantaged populations.
- b) Coordinate with non-health sector policies that offer co-benefits (reduce harmful emissions and promote health) such as clean energy, healthy food production and smart community design
- c) Conduct a vigorous public education campaign on actions to reduce the increasing risks due to climate change and extreme weather.

**GOAL 5: ENSURE THE AVAILABILITY AND SUSTAINABILITY OF QUALITY DRINKING WATER SUPPLIES TO SUPPORT A GROWING AND THRIVING MONTGOMERY COUNTY.**

Significant U.S. seasonal precipitation deficits are not confidently projected outside of the Southwest. In fact, conservation and water efficiency practices throughout the U.S., and in the WSSC service area, have resulted in relatively flat user demand despite growing population. However, there is high confidence in future temperature projections, and it has been shown that higher evapotranspiration rates cause average stream flows to decrease as much as 35 percent. Furthermore, if water supply is disrupted, there is barely enough supply redundancy to serve the area for 24 hours, give or take. Therefore, as climate change extremes get worse, as our region gets hotter, it is prudent to plan for almost inevitable periods of extreme water supply deficits. Stormwater and wastewater treatment systems are part of this equation – to ensure they function properly and are protected from storm damage.

According to a 2010 study of risks posed by climate change by the Interstate Council on the Potomac River Basin (ICPRB), in worst-case scenarios, with no changes to the current water supply system, a moderate drought in 2040 could cause mandatory restrictions on water use, depleted reservoirs, and inability to maintain environmental flows particularly in late summer.

Clearly, WSSC is working to address risks to our water supply from climate change as well as a number of other potential harms. However, there is much more that the County can do to reduce stress on water supplies and to build its resilience to droughts.



**Strategies:**

**5-1. Expand programs to develop localized self-sufficiency and resilience to water shortages.**

**5-2. Protect water quality that threatens potability of water supplies.**

**5-3. Integrate actions that recognize the inter-dependency and co-benefits between water, energy, and other resilience strategies.**

**Actions:**

**5-1. EXPAND PROGRAMS TO DEVELOP LOCALIZED SELF-SUFFICIENCY AND RESILIENCE TO WATER SHORTAGES.**

- a) Update the County Hazard Mitigation Plan to more robustly address water supply and other drought concerns.
- b) Adopt policies to expand water efficiency and conservation as a long-term effort, not just as an emergency response to impending drought, e.g. public education and incentive campaigns; use of water efficient fixtures in all county facilities; water efficient fixtures and landscape design in building codes and permits; etc.
- c) Understand the current pattern of water demand within various economic sectors as well as residential uses; understand supply chain risks; and design outreach and compliance campaigns for commercial and residential consumers both to minimize supply chain impacts and to enlist support for reducing demand.
- d) Expand existing DEP programs and develop additional programs for water capture and reuse to alleviate strain on potable water supply, e.g., expand the County's rain barrel program to encourage more on-site reuse of water; develop policies for reuse of graywater for irrigation or industrial processes; etc.
- e) Support efforts to build off-river water storage at the Travilah Quarry and examine other solutions for water storage including aquifer storage and recovery.
- f) Expand coordination and mutual assistance with neighboring counties and incorporated areas that rely on similar water sources to enact the broader drought management strategy.

**5-2. PROTECT WATER QUALITY THAT THREATENS POTABILITY OF WATER SUPPLIES.**

- a) Forcefully oppose all efforts to build the 3.5-mile "Potomac Pipeline" that would bring natural gas from Pennsylvania to West Virginia, which would threaten water supply for 6 million people in the metro area; and which would fuel the continued use of fossil fuels in Maryland.
- b) Redouble efforts to protect the Poolesville sole source aquifer, Potomac and Monocacy Rivers, and high-quality watersheds other water supply resources through wise land use plans and stream corridor revitalization.
- c) Strengthen stormwater runoff controls to prevent nutrient runoff into surface water.

- d) Review and amend road salting and treatment to protect drinking water sources.
- e) Given the increasing incidence of Harmful Algal Blooms nationwide, and for the first time in the Rocky Gorge (Duckett) Reservoir, Montgomery County should include such incidences in its emergency response alert system.
- f) Be alert for potential sources of pollution in Montgomery County that endanger the quality of water supplies, e.g. discharges from the Dickerson Incinerator; sediment and turbidity from stormwater and creek bed scour; nutrients from yards, pets, and agriculture; toxics from industrial facilities in our watersheds, etc.

**5-3. INTEGRATE ACTIONS THAT RECOGNIZE THE INTER-DEPENDENCY AND CO-BENEFITS BETWEEN WATER, ENERGY, AND OTHER RESILIENCE STRATEGIES.**

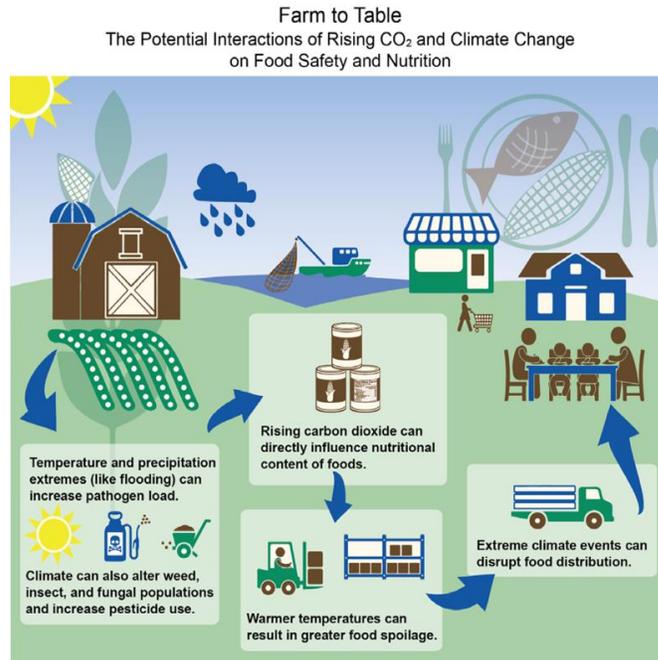
- a) Invest in resilient power systems for critical drinking water facilities, including pumps moving water to and from treatment facilities.
- b) Assess all wastewater pumping stations in Montgomery County for risk to energy disruption, and undertake efforts to improve their resilience (back-up electrical generation; protection from flooding; access for emergency crews; etc.)
- c) Press WSSC to accelerate its goal beyond reducing energy use 65% by 2035. Collaborate on opportunities to accelerate WSSC's move to bioenergy generation (poop to pump), anaerobic food digesters, use of water storage and gravity as a source of electricity; etc.
- d) Incorporate consideration of protecting water supplies as a co-benefit of strategies addressing other climate risks, e.g., ensure flood mitigation efforts, heat island mitigation, and design of infrastructure bring direct co-benefits to programs addressing drought.

**GOAL 6: CONSERVE AND RESTORE HABITAT TO SUPPORT HEALTHY POPULATIONS AND ECOSYSTEMS, REDUCE NON-CLIMATE STRESSORS ON NATURAL RESOURCES, AND PROMOTE CLIMATE-RESILIENT AGRICULTURE.**

**Rationale:** Montgomery County owns or manages 36,641 acres of parkland within 419 parks of which 28,909 acres are for open space and environmental preservation. The County is home to two federally listed endangered/threatened species, 87 state endangered animal and plant species, and 30 state threatened species. Climate changes are clearly evident in Maryland and species and habitats are responding to those changes. Climate change affects natural resources in a variety of ways, including increased ecological stress from heat, drought, and excessive precipitation; spread of non-native and invasive species; altered habitat; increased threat of wildfires; overwintering of animal and plant pests and pathogens; and shifts in the timing of spring and fall and associated environmental cues for wildlife.

The 93,000-acre Montgomery County Agricultural Reserve is also experiencing the effects of climate change, including fewer hay cuts due to drought and heavy precipitation, heat-related fruit scald in orchards, increased fungal disease in crops, and bacterial disease in poultry and livestock. The role and

importance of the Agricultural Reserve will increase as an important resilience strategy for Montgomery County, especially considering the likelihood that the supply chain that provides most of our food from outside the County will inevitably be disrupted as a result of climatic disruptions.



**Strategies:**

- 6-1. Conserve, expand, and connect natural and protected areas.**
- 6-2. Restore degraded habitat and enhance suburban habitat.**
- 6-3. Manage invasive and non-native species.**
- 6-4. Reduce non-climate stressors on native species.**
- 6-5. Promote climate-resilient agricultural practices.**

**Actions:**

**6-1. CONSERVE, EXPAND, AND CONNECT NATURAL AND PROTECTED AREAS.**

- a) Adopt and implement an aggressive goal to plant more trees throughout the County. (dup)*
- b) Develop a strategy focused on protecting the County’s existing trees from extreme drought and flash drought, including educating homeowners on how to protect their trees from severe drought. (dup)*
- c) Provide an incentive for residential and multi-family property owners by providing a 0.5% annual property tax relief for every tree planted and healthy beyond 20 trees per acre. (dup)*
- d) Educate homeowners and the landscaping sector to eliminate mulch mounds that kill trees. (dup)*
- e) Educate homeowners and incentivize them to adopt low management lawns that are more resilient, sequesters carbon, and reduces use of motorized (fossil fuel powered) maintenance.*

- f) Plant native tree species in the mid to northern portions of their geographic range and facilitate migration of tree species that may be more suitable for Maryland’s new climate.
- g) Update the 2017 Park, Recreation and Open Space Plan to expressly identify and address climate change impacts to parks and natural areas.
- h) Prioritize land acquisition to protect existing parks and natural areas, create natural buffers, and enhance connectivity of natural areas and stream corridors.
- i) Map and protect migration corridors for plants and animals adjusting to drought and other climate conditions.
- j) Increase protection of habitat for federal and state endangered and threatened species.

#### 6-2. RESTORE DEGRADED HABITAT AND ENHANCE SUBURBAN HABITAT.

- a) Restore riparian areas to reduce stormwater scouring, enhance habitat, and provide shading to reduce summer water temperatures.
- b) Remove barriers to fish passage (e.g., shad and river herring).
- c) Restore forested areas damaged by storms, disease, and fire.
- d) Encourage succession planting to improve forest ecosystem health.
- e) Manage deer populations to limit damage to understory plants and young trees.
- f) Educate and encourage suburban homeowners to plant native trees, understory plants, pollinator gardens, and to reduce area of managed lawns.

#### 6-3. MANAGE INVASIVE AND NON-NATIVE SPECIES.

- a) Control invasive species on county-owned properties and in natural areas, and replant cleared areas with native species to prevent invasives from regaining foothold. Ensure such efforts include follow-up and maintenance.
- b) Manage pests and pathogens affecting the urban canopy and forested areas, including deer populations.
- c) Monitor the arrival of new species (beneficial migration and invasive species) and track the loss of native species and climate-driven changes to native species.
- d) Educate homeowners and landscapers about native, non-native, and invasive species and changes in native species due to climate change.

#### 6-4. REDUCE NON-CLIMATE STRESSORS ON NATIVE SPECIES AND ECOSYSTEMS.

- a) Put in place stream buffers where they don’t exist and enlarge existing buffers to reduce pollutant runoff, cool water temperatures, and restore riparian structure and function.

- b) Control stormwater running into rivers and streams (see recommendations for improved stormwater management strategies under flood control section).
- c) Provide education for well/septic users to ensure best practices in maintaining systems
- d) Plant pollinator-friendly and native plantings on county-owned properties and public rights-of-way; educate homeowners about pollinator friendly practices (e.g., pesticides).

#### 6-5. PROMOTE CLIMATE-RESILIENT AGRICULTURAL PRACTICES.

- a) Encourage farmers to diversify crop varieties and select heat-tolerant crops to increase resilience to climate change impacts.
- b) Monitor climate change and impacts to agriculture and adapt agricultural practices to optimize resource allocation and production;
- c) Encourage farmers to improve soil health (e.g., compost, cover cropping, crop rotation).
- d) Establish demonstration projects for carbon-sequestering agriculture.
- e) Promote conservation agriculture measures (zero and/or minimum tillage, efficient water use); keep soil covered year-round; promote natural methods of pest control; plant flood-resilient species near floodplains.
- f) To increase carbon sequestration, incentivize landowners to farm regeneratively, to plant trees for reforestation, and to reduce large-lot lawn size.
- g) Leverage the Maryland Climate Change Commission’s recommendations to expand agriculture in Montgomery County.
- h) Expand availability of community gardens in urban/suburban areas to reduce farm-to-table distance and promote food security.

### GOAL 7: SUPPORT ECONOMIC OPPORTUNITIES AND ADDRESS ECONOMIC CHALLENGES FOR CLIMATE ADAPTATION.

**Rationale:** Montgomery County is competing with Virginia, the District of Columbia, and neighboring counties for building our economic base. Climate change poses real risks and real opportunities if we get out in front. This entails managing disruption, leveraging the fossil-fuel-free emerging economy, and taking advantage of the almost inevitable migration of people and businesses away from more vulnerable geographic areas. Branding Montgomery County as a climate friendly and climate resilient county; the home of green business and green R&D; transit-friendly, walkable, and bikeable; are opportunities to thrive despite impacts of climate change and to be a national showcase community.

**Strategies:**

**7-1. Business and development: minimizing disruption and maximizing opportunities.**

## 7-2. Financing adaptation.

## 7-3. Incentivizing adaptation.

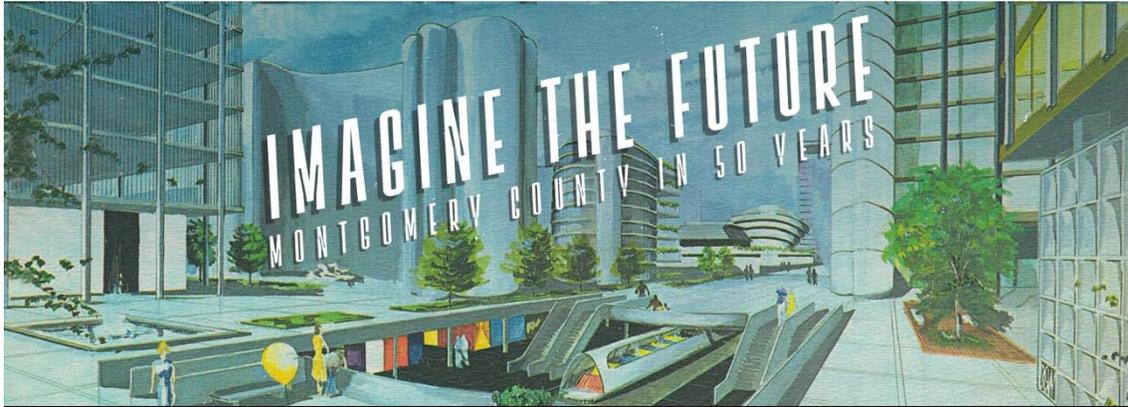


Image: <https://montgomeryplanning.org/focus-on-community-resiliency-at-february-winter-speaker-series->

### Actions:

#### 7-1. BUSINESS AND DEVELOPMENT: MINIMIZING DISRUPTION AND MAXIMIZING OPPORTUNITIES.

- a) Convene a business round table or task force to evaluate business opportunities posed by a climate-resilient and carbon free County, to consider potential impacts and business displacements, and to engage on promoting ways to reduce greenhouse gases and prepare for the impacts of climate change.
- b) Incentive and support businesses that build the transition to the clean energy and green infrastructure economy, such as transition from gas stations to electric fueling stations.
- c) Develop educational and training programs to build career pathways for a Green Workforce trained in the technology, design, construction and maintenance of the range of climate adaptation methods.
- d) Work with the Montgomery County Economic Development Corporation to build a Climate Resilient Montgomery brand that attracts young people, new businesses, and migration of populations, and helps showcase and build the economy of the future.
- e) Evaluate potential for attracting people, businesses, and government agencies migrating away from tidal areas of D.C., subject to flooding from sea level rise and overland flooding.
- f) Prepare to welcome environmental refugees from around the world and across Maryland and leverage their skills and knowledge to diversify the Montgomery County economy.

#### 7-2. FINANCING ADAPTATION.

- a) Expand the County Green Bank to incorporate support for preparedness and resilience to the impacts of climate change, and to leverage other sources of funding.

- b) Invest in a process and staffing to fully leverage federal and state funding opportunities; anticipate County needs and programs and advance preparation of proposals to take advantage of funding solicitations, despite those being out of step with the traditional CIP process. Have a proposal ‘in the drawer,’ and be ready to seek funding as it becomes available.
- c) Select a few climate adaptation projects to demonstrate how to build their financial and evidentiary case.
- d) Retain a consultant to advise on how to revise County benefit-cost analyses to evaluate adaptation project investments, e.g., how to incorporate future benefits and avoided costs, conduct multivariate analysis, and weigh the benefits and costs of adaptation vs. business-as-usual solutions.
- e) Review the CIP budgeting process, update out-of-date baselines, and link capital programs to better keep up with maintenance and restoration of infrastructure and natural systems that are increasingly being damaged by the impacts of climate change.
- f) Consider ways to leverage public funds for adaptation such as with public-private partnerships and performance contracting; consider models such as Portland’s Clean Energy Community Benefits Fund.

### 7-3. INCENTIVIZING ADAPTATION.

- a) Establish loans or other programs to help businesses and institutions purchase non-fossil fuel dependent back-up generators and cooling/heating equipment.
- b) *Adopt credits to builders for the percentage or coverage of shade trees retained and planted on-site to encourage the use of shade trees to provide additional summer protection for lower floors of building facades and green roofs to reduce heat island effect while providing comfortable exterior environments. (dup)*
- c) *Provide an incentive for residential and multi-family property owners by providing a 0.5% annual property tax relief for every tree planted and healthy beyond 20 trees per acre. (dup)*
- d) *Adjust the County Tree Canopy Ordinance that assesses builders a fee for removing trees to require functional mitigation that replaces the lost benefit of trees, e.g., cooling, stormwater abatement, watershed replenishment, etc. Require developers to seek revisions to their permits before removing trees. Use the fee to pay for off-site functional mitigation. (dup)*
- e) *Aggressively promote and incentivize use of green roofs, native plantings, rain gardens, and other nature-based ways to reduce runoff and cool heat island effect. (new and existing buildings). (dup)*
- f) *Conduct a public education campaign on FEMA NFIP insurance; develop incentive program to encourage residents to obtain flood insurance. (dup)*
- g) *To increase carbon sequestration, incentivize landowners to farm regeneratively, to plant trees for reforestation, and to reduce large-lot lawn size. (dup)*
- h) Incentivize solar on barns and storage shed rooftops, as well as on industrial properties such as the Dickerson Power Plant and the acreage under transmission power lines.

- i) *Provide incentives and subsidies to landlords and low-income homeowners to install adaptive technologies and retrofit buildings and homes. (dup)*
- j) *Adopt requirements and/or incentives for landlords to install protections against basement flooding and to mitigate mold. (dup)*

**GOAL 8: CONDUCT A VIGOROUS OUTREACH AND ENGAGEMENT CAMPAIGN TO ACCELERATE ADAPTATION AND RESILIENCE.**

**Rationale:** Being prepared for the impacts of climate change involves governments, nongovernmental institutions and, importantly, individual community members. Understanding sources of risk, understanding available resources, and understanding how to protect one’s home and family are all components of preparedness and resilience. To be effective, raising awareness and motivating action requires a variety of culturally aware strategies. Fortunately, the population in Montgomery County has been shown to be more aware and accepting of this issue. According to Ed Maibach (George Mason University Center for Climate Change Communication), and the Yale Program on Climate Change Communication, Montgomery County has a higher level of recognition of the issue of climate change (57% alarmed or concerned; 33% cautious or disengaged; only 20% doubtful or dismissive) than the national average. However, until recently, most Americans misunderstood when, where and what will be harmed. This is the task of Montgomery County – to raise awareness of potential harms and ways we can protect ourselves.

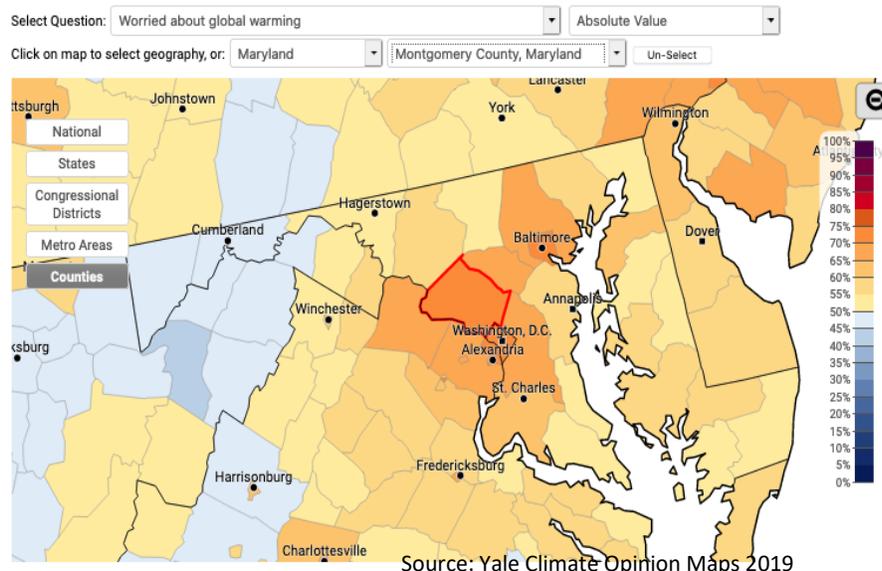
Data show that, in Montgomery County:

- 73% of adults are worried about global warming.
- 78% support a carbon tax on fossil fuel companies, while reducing other taxes equally.
- 75% say environmental protection is more important than economic growth.
- 86% support tax rebates for people who purchase energy-efficient cars and solar panels.
- 66% say our local govt should be doing more about GW, 69% say our Governor should do more, and 77% say Congress should do more.
- Only 47% talk about global warming at least “occasionally.”

**Strategies:**

- 8-1. Build public awareness about the County’s actions on hazard mitigation and adaptation to climate change.**
- 8-2. Build community preparedness strategies to increase resilience.**
- 8-3. Engage the business community about the potential impacts and opportunities posed by climate change.**
- 8-4. Work with other jurisdictions to develop rules, amend codes, and build capacity for adaptation.**

## Estimated % of adults who are worried about global warming (60%), 2019



### Actions:

#### 8-1. BUILD PUBLIC AWARENESS ABOUT THE COUNTY'S ACTIONS ON HAZARD MITIGATION AND ADAPTATION TO CLIMATE CHANGE.

- a) Update information given to 411/911 emergency services and update web pages for Health and Human Services, Office of Emergency Management, etc.
- b) Initiate traveling "roadshows" to go to community organizations, schools, hospitals, community centers, etc.

#### 8-2. BUILD COMMUNITY PREPAREDNESS STRATEGIES TO INCREASE RESILIENCE.

- a) Undertake a vigorous public outreach campaign aimed at empowering the public with the information on how to protect their families and homes from the impacts of climate change.
- b) Organize and support events that contribute to community resilience and company "neighborliness" so that residents have a climate-ready social network and are aware of resources before an emergency occurs.
- c) Modify alert systems and communication with schools, hospitals, homeless shelters, and facilities for the elderly or disabled, to include high heat and extreme cold warnings, and ensure temperature is included in public emergency response plans.
- d) Train health professionals to understand the health effects of climate change on families, children, the elderly, those with underlying health conditions, and economically disadvantaged populations.
- e) Collaborate with non-health sector policies that offer co-benefits (reduce harmful emissions and promote health) such as clean energy, healthy food production and smart community design

- f) Conduct a vigorous public education campaign on actions residents can take to reduce their risks from climate change and extreme weather.

**8-3. ENGAGE THE BUSINESS COMMUNITY ABOUT THE POTENTIAL IMPACTS AND OPPORTUNITIES POSED BY CLIMATE CHANGE.**

- a) *Work with the business and development community to understand potential impacts of climate change, including supply chain disruptions. (dup)*
- b) *Enlist the support of the business and development community to adopt water, electric, and fuel conservation strategies to minimize risk and advance toward a more resilient County. (dup)*

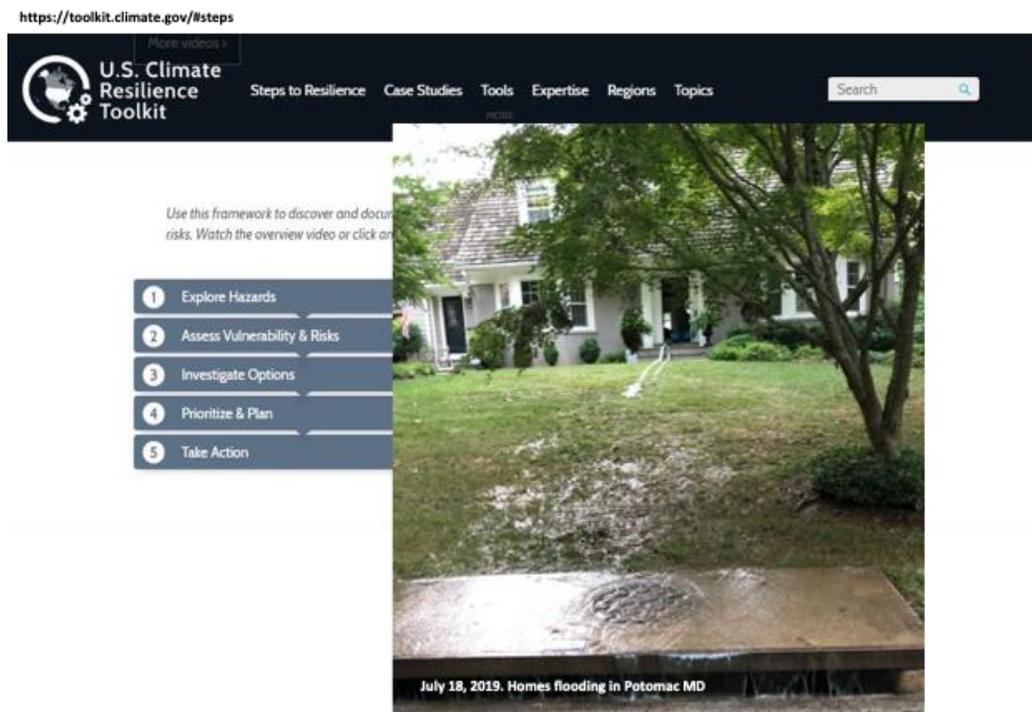
**8-4. WORK WITH OTHER JURISDICTIONS TO DEVELOP RULES, AMEND CODES, AND BUILD CAPACITY FOR ADAPTATION.**

- a) Support legislation in the Maryland Statehouse for climate and adaptation related legislation:
- Heat Stress Protection Act — Protecting Workers from Dangerous Heat Exposure (Del. Charkoudian)
  - Organics Recycling and Waste Diversion — Food Residuals (Del. Charkoudian) - compost bill
  - Healthy Soils Act (Del. Stein)
  - Ending Subsidies for Incineration (HB438/SB560)
  - Climate Solutions Act (HB1425/SB926)
  - Public Service Commission Climate Test (HB531/SB656)
  - Community Choice Energy
- b) Work with Maryland and NOAA to ensure that NOAA's outdated and inadequate Atlas 14 precipitation statistics for Maryland are updated and recalculated, and ensure that Maryland update and revise stormwater, floodplain, and other codes and regulations that reference Atlas 14, TP40, or any previous NOAA publication.
- c) Engage with the State and the Centers for Disease Control to take advantage of health and climate change-focused grants, pilot programs, technical assistance, and public outreach events.
- d) Engage with the climate change adaptation science community to access expert resources and technical assistance, including the USGS Southeast and Northeast Climate Adaptation Science Centers; the NOAA Urban Northeast CCRUN RISA and the Mid-Atlantic MARISA); and the USDA North Atlantic and South Atlantic Landscape Conservation Cooperatives.

**GOAL 9: REEVALUATE AND UPDATE COUNTY OPERATIONS, STRATEGIES, AND CODES TO ACCOUNT FOR THE RISKS OF CLIMATE CHANGE IMPACTS AS WELL AS TO REDUCE GREENHOUSE GASES.**

**Rationale:** Montgomery County decision making in every aspect cannot be fully informed without accurate and up-to-date based on both historic observations as well as models examining future climate risks. Further, because civilization is not on a trajectory to adequately control greenhouse gas emissions, and because scientists are finding that impacts are accelerating beyond previous projections, it is prudent to ensure that County operations are reviewed and updated to be as robust as possible under various future scenarios, including “worst case scenarios.” Decisions can then be made balancing risk tolerance with costs of mitigating those risks.

Montgomery County has some 51 action plans over 20 operational departments, 9 administrative departments, and a dozen other related agencies, as well as dozens of physical facilities. Consideration of the sources of greenhouse gases as well as the impacts of climate change should be reflected in all county planning and operations.



**Strategies:**

- 9-1. Create a common set of projections for Montgomery County using moderate to high projections of global greenhouse gas scenarios.
- 9-2. Conduct a bottom-up evaluation of county departments, operations, and facilities; and update county codes, operations, and services.
- 9-3. Implement and improve the County Hazard Mitigation Plan.
- 9-4. Revise county codes, operations, and services to incorporate consideration of impacts of climate change.
- 9-5. Update Data, information, and monitoring to inform risk assessments.

**Actions:**

**9-1. CREATE A COMMON SET OF PROJECTIONS FOR MONTGOMERY COUNTY USING MODERATE TO HIGH PROJECTIONS OF GREENHOUSE GAS SCENARIOS.**

- a) Use the most recent downscaled climate models and methods under moderate and high emission scenarios to evaluate potential climate changes for Montgomery County.
- b) Form a County Scenario Development Team (SDT) tasked with developing various climate and socioeconomic future scenarios for use in county Vulnerability Assessments.
- c) Develop guidance for county departments scenarios and methods for conducting climate change-informed reviews of operations. Include how to evaluate co-benefits as well as trade-offs between adaptation strategies, sequestration strategies, and greenhouse gas mitigation strategies.
- d) Work with other regional entities (e.g., Maryland National Capital Park and Planning Commission, State of Maryland, Montgomery County Public Schools, Metro DC Council of Governments,, etc.) to evaluate climate change projections, climate analogs from states to the south, and other studies to inform risk assessments; Examine and coordinate with other regional analyses, e.g., DC Adaptation Plan, Washington Suburban Sanitary Commission (WSSC) PG County evaluation; WSSC Blue Plains' analyses, Pepco analyses, etc.
- e) Integrate data collection, monitoring, and evaluation of progress into ongoing County operations.

**9-2. CONDUCT A BOTTOM-UP EVALUATION OF COUNTY DEPARTMENTS, OPERATIONS, AND FACILITIES; AND UPDATE COUNTY CODES, OPERATIONS, AND SERVICES.**

- a) All county departments must develop bottom-up climate change vulnerability assessments by July 1, 2021, incorporating the implications of the County's range of plausible future scenarios of risk (temperature, precipitation, drought, etc.) to identify robust strategies including opportunities for achieving co-benefits (e.g., sequestration).
- b) Analysis and consideration of adaptation options must include an economic analysis of avoided costs or cost of inaction in the cost-benefit analysis used for decision making.
- c) Mainstream climate change mitigation and adaptation in all county operations and services.
- d) Strategies and plans should include an examination of co-benefits and potential unintended consequences of potential adaptation actions, including trade-offs with greenhouse gas mitigation policies.
- e) All county departments should undertake to coordinate strategies and plans as cross-departmental efforts, using shared information and shared responsibilities.

### 9-3. IMPLEMENT AND IMPROVE THE COUNTY HAZARD MITIGATION PLAN .

- a) Prioritize full and robust implementation of the existing 2018 County Hazard Mitigation Plan.
- b) Update the Hazard Mitigation Plan to fully assess the impact of future climate change and expected land use and development; identify and prioritize vulnerable populations; include evaluation of unincorporated urban areas in the County (e.g., Silver Spring, Bethesda); and conduct a full capability assessment that identifies departmental limitations.
- c) Update the County Emergency Management operations and planning to include the increased risks resulting from climate change, including a capacity assessment and assessment of single-points-of-failure in the emergency response capability during cascading and compounding events.
- d) Prepare for cascading and compounding events by conducting a capacity assessment and assessment of single points of failure in the response capability of the County’s Office of Homeland Security and Emergency Management.
- e) Develop, test, and regularly update emergency response and business continuity plans.
- f) Establish “Resiliency Hubs” with emergency solar charging stations, micro-grids to ensure power, potable water supplies, etc.
- g) Develop a ‘Resilience Package’ and conduct Resilience Audits, similar to the Energy Audits, to help residents and landlords identify reduce risk of climate impacts in and around homes.
- h) Work with Montgomery County Public School to rehabilitate schools for resilience; identify schools that can be used as emergency centers.

### 9-4. REVISE COUNTY CODES, OPERATIONS, AND SERVICES TO INCORPORATE CONSIDERATION OF IMPACTS OF CLIMATE CHANGE.

- a) Break the silos between County departments that inhibit achieving adaptation, carbon sequestration, and greenhouse gas mitigation goals. Develop procedures to encourage (and enforce) collaboration between departments to maximize achievement of county goals and to avoid unintended consequences; notably: between Agricultural Services, Environmental Protection, Permitting Services, Emergency Management and Homeland Security, Health and Human Services, Housing and Community Affairs, Transportation, and others.
- b) Upgrade design of critical facilities and emergency centers by adopting building codes that are higher than basic international building codes, considering strong winds, higher temperatures, frequent power disruptions, etc. (Consider designs for the 500-year storm, water supplies, multiple power feeds from separate substations; on-site renewable generation, design elements for habitability without electricity, etc.)

- c) Place a moratorium on waivers for tree cutting and for stormwater controls and avoid taking actions that might frustrate achievement of the County’s adaptation goals until the climate consultant’s report is presented and acted on by the County Council.
- d) Review building code provisions for strictness of code provisions on wind, runoff, etc. For example, roof straps for high wind in higher buildings. Standards for wind resistance for solar panels, runoff from solar roofs, etc. Review inspection and enforcement mechanisms and resources allocated to meet building code standards.
- e) Review County budgets for repair of infrastructure, removal of downed trees, snow management; as well as storm damage to waterways, parks and trails, and campgrounds.
- f) Work with the private insurance industry to develop practices and products that help homeowners and businesses mitigate risk of damage from storms.
- g) Address County staff shortages for programs such as Rainscapes and tree planting by engaging volunteers and promoting messages of empowerment, e.g., “we can do this!”

**9-5. UPDATE DATA, INFORMATION, AND MONITORING TO INFORM RISK ASSESSMENTS.**

**GIS**

- a) \*Develop GIS data layers on demographics and vulnerable populations (elderly/nursing homes, economically depressed, animal shelters, etc.); integrate with watersheds, impervious cover, and other environmental data. Incorporate State of MD sea level rise and storm surge projections into County GIS systems and data layers.
- b) Ensure that GIS tools and data layers are available and shared across county agencies and available to residents as appropriate.
- c) Develop a risk rating scale; and identify vulnerable populations, critical facilities, high-value areas, and high-risk areas to prioritize for adaptation implementation

**Flood Risk**

- d) *Deploy more rain and stream gages throughout the county to build a more accurate observational ability to monitor changes over time. (dup)*
- e) *Update County floodplain maps to the 30-acre watershed. (dup)*
- f) *Conduct a community survey on home flooding events to identify hotspots; Overlay with GIS layers including land cover change; evaluate over time considering changes in precipitation, storm water flow, and other anomalies. (dup)*
- g) *Work with NOAA National Weather Service to revise Maryland's IDF precipitation statistics. (dup)*

**Heat Risk**

*h) Deploy sensors or other methods to monitor heat risk. (dup)*

*i) Develop maps of heat risk. (dup)*

**Wind Risk**

j) Develop county-wide wind gust mapping